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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/056,925	01/24/2002	Masateru Tadakuma	FURUK.003AUS	4007
22850	7590	04/19/2004	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			SONG, SARAH U	
			ART UNIT	PAPER NUMBER

2874

DATE MAILED: 04/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.		Applicant(s)	
	10/056,925		TADAKUMA ET AL.	
	Examiner		Art Unit	
	Sarah Song		2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>1003</u> . | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

JH
1. Applicant's communication filed on January ³⁰~~3~~, 2004 has been carefully studied by the Examiner. The arguments advanced therein, considered together with the amendments made to the claims, are persuasive and the rejections based upon prior art made of record in the previous Office Action are withdrawn. Claims 1 and 36 have been amended. Claims 1-38 are pending.

Information Disclosure Statement

2. The prior art documents submitted by the applicant in the Information Disclosure Statement filed on October 22, 2003 have all been considered and made of record (note the attached copy of form PTO-1449).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claims 1-12, 14-27 and 29-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tadakuma et al. (*A 104GHz 328fs soliton pulse train generation through a comb-like dispersion profiled fiber using short high nonlinearity dispersion fibers*, cited by Applicant) in view of Yatsu et al. (*High-quality sub-100-fs optical pulse generation by fiber-optic soliton compression of gain-switched distributed-feedback laser-diode pulses in conjunction with nonlinear optical fiber loops*, cited by Applicant).** Tadakuma et al. discloses a comb-like dispersion profiled fiber (CDPF) having three or more portions wherein adjacent portions of said three or more portions have different dispersive characteristics (see Figure 1).

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Tadakuma et al. also discloses that the resultant pulses from the CDPF had a pedestal (see Results). Tadakuma et al. does not disclose the CDPF to be formed into an optical loop mirror.

5. Yatsu et al. discloses an optical fiber having end portions coupled (by means of 50/50 coupler having four ports) so as to form an optical loop mirror (see Figure 1). It would have been obvious to one having ordinary skill in the art at the time the invention was made to couple the ends of the CDPF of Tadakuma et al. so as to form an optical loop mirror in order to suppress pedestals of the pulses as taught by Yatsu et al. (see page 1172, 2nd paragraph).

6. Resultantly, an optical input pulse input into the input port of the optical loop mirror would be split into two lesser magnitude optical pulses, which are counter-propagating (i.e. propagate in opposite directions through said fiber optical loop). The output port would also be resultantly optically connected to each of said ends of the fiber optical loop so as to receive energy from both of said counter-propagating pulses. Furthermore, the propagating pulses would be compressed and phase-shifted with respect to each other so as to optically interfere with each other to prevent noise (pedestals) associated with said optical pulses from being output from said output port.

7. Regarding claim 2, the CDPF sections increase in length from one end to the other end, as shown in Figure 1.

8. Regarding claim 3, Table 2 discloses sections having a length between about 0.3 and about 200 meters.

9. Regarding claims 4-6 and 16, Tadakuma et al. discloses an embodiment comprising 5 pairs, or 10 sections, delimited by changes in dispersion (top of page 179).

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10. Regarding claims 7 and 17, it is evident from the disclosed structure of the CDPF that an optical signal propagating therethrough is repeatedly compressed.

11. Regarding claims 8, 20, 25 and 30, Tadakuma et al. does not specifically disclose an optical amplifier located within the CDPF or disposed to amplify light prior to coupling into the coupler. Optical loop mirrors comprising amplifiers are well known in the art for amplifying an optical signal propagating therein. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide an amplifier within the CDPF or prior to the coupler in order to compensate for a decrease in pulse energy.

12. Regarding claims 9 and 21, a further chirp compensation fiber is not specifically disclosed. An additional chirp compensation fiber would have been obvious to one having ordinary skill in the art at the time the invention was made in order to compensate for residual chirp of the generated optical pulse.

13. Regarding claims 10, 11 and 12, polarization controllers or polarization maintaining fibers are not specifically disclosed. Polarization controllers within or upstream from a fiber optic loop are well known in the art for the purpose of minimizing natural birefringence in the system. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a polarization controller within the fiber optic loop to minimize the natural birefringence in the fiber optic loop. Furthermore, a polarization maintaining fiber would have been obvious since it was known in the art that a polarization maintaining fiber would have been functionally equivalent to a fiber comprising a polarization controller.

14. Regarding claims 18 and 19, note Figure 5 of Tadakuma et al.

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15. Regarding claims 23, 24 and 37, Tadakuma et al. also discloses a pulsed light source coupled to the CDPF comprising a plurality of optical sources having different wavelengths that are combined to produce a modulated light beam (see top of page 179 and Figure 2). Therefore, the method comprising the steps of optically coupling the end portions of the fiber and coupling a pulsed light source would also have been obvious as setting forth requisite steps for providing the device as discussed above.

16. Regarding claim 26, an isolator is not specifically disclosed. An isolator would have been obvious to one having ordinary skill in the art at the time the invention was made to prevent unintentional feedback to the light sources.

17. Regarding claim 27, note Figure 2 of Tadakuma et al.

18. Regarding claims 31-36, the method steps are also obvious as setting forth requisite steps for operation and manufacture of the device as discussed above.

19. **Claims 13 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tadakuma et al. in view of Yatsu et al. as applied to claim 1 or 13 as applicable above, and further in view of Chernikov et al. (*Comblike dispersion-profiled fiber for soliton pulse train generation, previously relied upon*).** Tadakuma et al. and Yatsu et al. do not specifically disclose a CDPF optically coupled to said input of said optical mirror such that optical pulses are compressed prior to input into said optical mirror. Chernikov et al. discloses CDPF coupled after an optical source for compressing optical pulses. One of ordinary skill in the art would have found it obvious at the time the invention was made to provide the CDPF coupled between the optical source and the optical mirror to provide precompressed pulses to the optical mirror. One

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of ordinary skill in the art would have been motivated to provide a CDPF prior to input of the optical mirror to enhance the pulse compression and shaping achieved by the device.

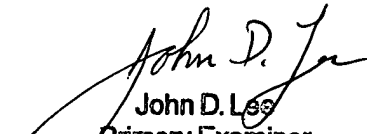
Response to Arguments

20. Applicant's arguments with respect to claims 1-38 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

21. Any inquiry concerning the merits of this communication should be directed to Examiner Sarah Song at telephone number 571-272-2359. Any inquiry of a general or clerical nature, or relating to the status of this application or proceeding should be directed to the receptionist at telephone number 571-272-1562 or to the technical support staff supervisor at telephone number 571-272-1615.


sus


John D. Lee
Primary Examiner